DOCUMENT RESUME

ED 282 175 CS 008 760

AUTHOR Feldmann, Shirley C.; Fish, Marian C.
TITLE Reading Comprehension of High School Students on Print vs. Microcomputer-Generated Text.
PUB DATE Apr 87
NOTE 9p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, DC, April 20-24, 1987).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Age Differences; *Computer Assisted Instruction; High Schools; Junior High Schools; *Media Adaptation; *Media Selection; Microcomputers; *Reader Text Relationship; Reading Ability; Reading Attitudes; *Reading Comprehension; Reading Research; Screens (Displays); Sex Differences

ABSTRACT

A study examined the relative comprehension difficulty and the influence of reader and text characteristics on reading comprehension for texts presented in traditional print or on the microcomputer screen. Two urban samples of mixed ethnicity were used, 95 low reading level high school students (grades 9 through 12) and 112 high ability eighth grade students. Students read two types of text: (1) text that disseminated information and required recall or inferences and (2) text requiring written responses to specific directions. Each subject read one type of text passage presented either on paper or on microcomputer screen. Students also completed a questionnaire that measured their interest in and experience with the type of reading tasks they performed and elicited their subjective evaluations of the text. In the high ability eighth grade sample, results for media and reader characteristics (interest and experience) showed no significant differences for any variable. In the high school sample, however, the microcomputer group fared significantly better than the print group on comprehension, and males using microcomputers comprehended better than females on the direction following task. In both media, strong readers found the texts easier to read and found it easier to go from the reading passages to their answer sheets than did weak readers. Most microcomputer users reported no difficulties in keeping their places on the computer screen, but a quarter said that the screen hurt their eyes. These results support presentation of curriculum materials in either medium. (SKC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED282175

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Reading Comprehension of High School Students on Print vs Microcomputer-generated Text

Shirley C. Feldmann

The City College, City University of N.Y.

Marian C. Fish

Queens College, City University of N.Y.

Paper presented at the American Educational Research Association, Washington, D.C., April 1987.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Shirley C. Feldmann

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

CS008760

Reading Comprehension of High School Students on

Print vs Microcomputer-generated Text

Objectives

This study examined: 1)the relative difficulty of reading comprehension when presented in traditional print or on the microcomputer screen, and 2) the influence of other reader and text characteristics on reading comprehension in the two media.

Background

An important issue in the use of microcomputers for classroom instruction is whether reading from the computer monitor is more difficult than from the printed page. Since reading comprehension is a function of several clusters of factors, such as text characteristics, reader characteristics and human-factors considerations, it is possible that the interaction of these factors may be different when either print or microcomputer modes are employed. Research studies report some ambiguity concerning this question. Muter, Latremouille & Treurniet (1982) and Hanson, Doring & Whitlock (1978) found time differences favoring print between the two media, while Heppner, Anderson, Farstrup & Weiderman (1985) reported that reading performance was better with print than when using the computer monitor. In two earlier studies the present authors (Fish & Feldmann, 1987) found no time differences when using samples of graduate students but in one case found a comprehension difference favoring print when very difficult text was used. Use of easier text produced no comprehension differences between the media. Similarly, ambiguities were reported concerning the role of reader characteristics in comprehension (Reinking & Schreiner, 1985; Heppner et. al, 1985).

Method

The present study was based on the previous two studies but used junior-high school and high-school students in order to examine the effects of the two media on a wider range of reading abilities. As in the other studies, there were two types of reading text, both commonly used in classroom instruction: (1) informational text that disseminates information and requires recall or inference-making and (2) text that requires following directions by completing a specific series of written responses. Reader characteristics were: 1) reading competence as measured by statewide achievement tests, 2) students' interest in and experience with reading in either print or on the computer as well as their estimation of the difficulty of the task, and 3) a pre and post-self-efficacy rating on the reading task presented. In addition, students completed a checklist to select possible text and media characteristics that might have influenced the ease or difficulty of the comprehension task. These characteristics included vocabulary, sentence length, opportunity to reread, and legibility.

Two samples were used in this study. One included 95 students in grades 9 through 12 attending two large urban high schools. The other was 112 8th graders from an urban junior-high school. Both samples had a diverse ethnic mix, Hispanic, Asian, Black and others. The reading scores of the high-school students ranged from 4.5 to 12.5 with a mean of 7.1, whereas the junior high school scores ranged from 5.1 to 12.5 with a mean of 10.5. As is evident, the high-school students were markedly below grade level, while the junior high school students had reading scores surpassing their grade level. In the high-school sample students from seven English and Reading classes were assigned to one of four groups, having either a print information, microcomputer information, print directions or microcomputer directions task. Students in the microcomputer conditions worked in an Apple IIe lab with monitors having white print on a green background.

These students were enrolled in classes using the microcomputer each week. Similarly, the student subjects in the junior high school had been enrolled in microcomputer classes from the beginning of the year and also used Apple IIe computers. The sample was drawn from six classes in the junior high school.

For the reading tasks, the informational material in both settings consisted of three passages of between 150-250 words, each followed by three to six multiple-choice questions. These were taken from outdated reading achievement tests. The directional material required subjects to read and follow instructions such as buying concert tickets or making several bank transactions.

The post questionnaire asked all students to identify text and media characteristics that made the reading easy or difficult for them. While the print group had 11 questions, the microcomputer group had 7 additional questions specifically related to human factors such as reading from a monitor.

Data Analysis

For the primary analyses, that is, the effects of the two media on two kinds of reading material, a series of ANCOVAS, using the reading competence measure as the covariate, were performed, with the assigned medium condition and sex as independent variables. In addition, the effects of reader characteristics, such as interest in and experience with the assigned medium and pre- and post-self-efficacy, were analyzed using ANOVAS. Two subsamples were selected, that is, strong readers from the junior high school sample (on or above grade level in reading), and weak readers from the high school sample (below grade level in reading). A profile of the media and text characteristics perceived by students to have hindered or enhanced the reading task was drawn from these subsamples.

In the primary analyses (ANCOVAS) for the junior-high school sample, results for media and reader characteristics show that there were no significant differences for either comprehension or directions for media or sex. There were also no significant differences for reader characteristics, that is, interest or experience, or perception of task difficulty or pre-efficacy. However, for post-efficacy on the directions task, those who were most efficacious got higher scores under both print and microcomputer conditions. There was a significantly lower post-efficacy score for the total sample ($t = 2.15$, $p = .03$); closer inspection revealed that the efficacy drop was greatest for the print comprehension group.

The ANCOVA for the high school sample revealed that the microcomputer group did significantly better than the print group on comprehension ($F = 5.37$, $p = .02$). For directions there were no main effects, but there was an interaction between medium and sex, with the boys in the microcomputer group performing significantly better than the girls. There were no significant differences by sex or group for the reader characteristics (experience or interest) for either of the two reading tasks. Students' perception of the potential difficulty of the task was not related to scores on the two tasks nor were the pre- and post-efficacy ratings.

Looking at the responses of the weak readers to the text characteristics questions, 25 to 36 percent identified vocabulary, concepts, and questions as difficult while 27 to 38 percent found those three areas to be easy. In the strong reader sample 5 to 25 percent found vocabulary, concepts, and questions hard, while 61 to 80 percent found those three to be easy. As expected, more strong readers found the text to be easy than did weak readers.

For procedural questions, about 5% of both samples found it hard to read the print, but 68% found it easy. There were differences, however, between

the two samples on students' perceptions of going from the passages to the answer sheet. Sixty percent of the strong readers found it easy, while 29% of weak readers found it easy; in both samples 15 to 20 percent found it hard. On these questions the microcomputer sample did not seem to differ from the print sample.

There were no obvious differences by reader group for the microcomputer questions. Although few felt it was hard to read from the screen or keep their place on the screen, and many more said it was easy (55 to 60 percent), still both groups said that the screen hurt their eyes (23 to 31 percent).

Discussion

The results of this study are consistent with previous findings by the authors (Fish & Feldmann, 1987) which indicate that reading from the microcomputer screen is not more difficult than reading from print. In fact, in one directions and one comprehension task, the microcomputer subjects did better than the print subjects.

As with the graduate-school samples used in the prior studies, subject characteristics, that is, interest and experience, prediction of difficulty and pre-and post-efficacy ratings were not affected by the medium.

As was evident in the present study, each sample was fairly skewed; the high school sample was comprised primarily of weak readers, and the junior-high school sample was primarily strong readers. Results showed that reading competence was not a factor in performance for either medium. This suggests that curriculum materials could be presented on either medium interchangeably regardless of reading competence.

Not surprisingly, student perceptions of media and text characteristics show that weak readers perceive the text as having more difficulties for them

than do strong readers. Also, weak readers felt more uncomfortable shifting between passages and questions.

The fact that both strong and weak students answered similarly on ease of reading from the screen and keeping one's place on the screen is further support for the presentation of curriculum materials on either medium. It is of concern to note, however, in both groups approximately one quarter of the students said reading from the screen hurt their eyes.

In conclusion, when two types of reading text were presented to students from 8th grade through graduate school, no differences in performance were found by medium. Similarly, the reader characteristics had no effect across these samples. The microcomputer does not seem to hinder the performance of poor readers any more than print. Further research on human-factors considerations is needed.

References

Fish, M.C. & Feldmann, S.C. (1987) A comparison of reading comprehension using print and microcomputer presentation. Journal of Computer-based Instruction, 14.

Hansen, W.J., Doring, R.R., & Whitlock, L.R. (1978) Why an examination was slower on-line than on paper. International Journal of Man-Machine Studies, 10, 507-519.

Heppner, F.H., Anderson, J.G., Farstrup, A.E., & Weiderman, N.H. (1985). Reading performance on a standardized test is better from print than from computer display. Journal of Reading, 28, 321-325.

Muter, P., Latremouille, S.A., & Treurniet, W.C. (1982). Extended reading of continuous text on television screens. Human Factors, 24, 501-508.

Reinking, D. & Schreiner, R. (1985). The effects of computer-mediated text on measures of reading comprehension and reading behavior. Reading Research Quarterly, 10, no. 5, 536-552.